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SPECIFICATION

OF THE

PATENT

GRANTED TO

Mr. JAMES JORDAN,

~~OF OAK HILL,~~

~~IN THE PARISH OF STRETTON-MARETT, IN THE~~
COUNTY OF SOMERSET,

FOR HIS

NEW INVENTION

IN THE

A R T

OF

CONSTRUCTING

BRIDGES, AQUEDUCTS, &c.

WITH THREE PLATES.

BRISTOL:

PRINTED BY J. RUDHALL.

MDCCXCVII.

MR. JORDAN'S NEW PATENT SUSPENDED BRIDGE.

with a Draw Bridge in the centre?

Walker sculp.



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SPECIFICATION, &c.

TO all to whom these presents shall come, I JAMES JORDAN, of *Oak-Hill*, in the Parish of *Shepton-Mallet*, in the County of *Somerset*, Gentleman, do send greeting:—Whereas his Most Excellent Majesty, King GEORGE the Third, by his Letters Patent under the Great Seal of *Great-Britain*, bearing date at *Westminster*, 24th of *May*, 1796, in the thirty-sixth Year of his Reign, did give and grant unto me the said JAMES JORDAN, my Executors, Administrators, and Assigns, his special Licence, that I the said JAMES JORDAN, my Executors, Administrators, and Assigns, during the Term of Years therein expressed, should and lawfully might, make, use, exercise and vend within *England*, *Wales*, and the Town of *Berwick-upon-Tweed*, my new-invented Method of constructing BRIDGES, AQUEDUCTS, &c. in which Letters Patent there is contained a proviso, obliging me the said JAMES JORDAN under my Hand and Seal to cause a particular Description of the Nature of my said Invention, and in what Manner the same is to be performed, to be enrolled in his Majesty's High-Court of Chancery with-

in six Calendar months next, and immediately after the date of said recited Letters Patent as in and by the same (relation being thereunto had) may more fully and at large appear.

Now KNOW YE, that, in compliance with the said proviso, and in pursuance of the said statute, I the said James Jordan do hereby declare, that my invention consists in *suspending* to an arch or arches, in manner herein after described, bridges, (with or without draw bridges therein,) aqueducts, the tops or coverings of buildings and other erections, instead of the methods heretofore adopted for constructing and supporting them; whereby the weight or weights thereof will be *suspended*, so as to leave the parts under the same between the buttresses or other end supports of bridges and aqueducts, and between the walls or other enclosures of buildings and other erections, nearly as free as if no such bridge, aqueduct, top or covering, were placed over the same; by which means, intermediate piers will be avoided, the navigation of rivers be improved, many causes of obstruction and damage be removed, and bridges be constructed and placed in a way likely to preserve them from decay, a much greater length of time than when they have a connection with the river under them. The materials for such arch or arches, to which bridges and other works are to be suspended, on the principles of
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Fig. 1

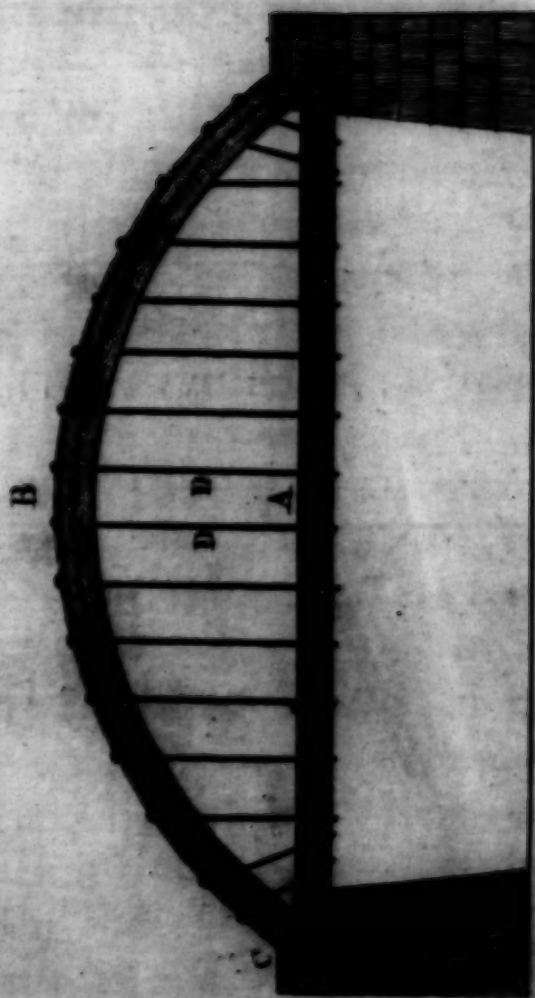
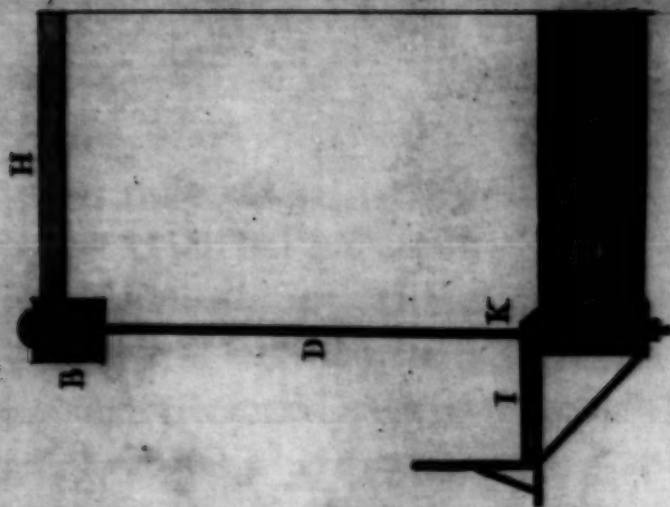


Fig. 2



my invention, may be of the different kinds herein after specified, or any other whatsoever, capable of being used in the construction of the same; and the form and strength of the several parts may vary, according to the nature, extent, and other circumstances belonging to and dependent upon them. It will likewise appear, from the explanations herein after given of *some* of the methods in which my invention may be applied, that most of the works erected on the principles thereof will not have a *lateral*, but only a *perpendicular* pressure on the buttresses, walls, or other end supports; which in many cases will be of great advantage. To explain more fully the nature of my invention, and the manner in which the *principles* of it may be applied in several cases, although with *many* variations in the form and strength of the parts, (the *principle* being still retained,) I have annexed drawings, which the following particulars are intended to elucidate. Fig. 1. (Plate XII.) represents the elevation, and Fig. 2. half the transverse-section, of a bridge, without a draw-bridge, and with one of the buttresses unfinished. It may be formed, and erected, in the following manner: A, shews the horizontal rib of the bridgeway, composed of well-seasoned timber, in different lengths, so as to break the heading joints, and in three thicknesses, (but it may be in more,) with cast-iron plates, solid or hollow, close or open, as

wide as the thickness of the ribs; the timbers and the iron to be bolted together (see A, Fig. 2.) by strong wrought-iron bolts, with large heads and nuts. These ribs may be put together on land, and be conveyed to their place on the buttresses, by means of floating-rafts or vessels, with proper mechanical or other supports thereon, and by such other powers on the land as the nature of the case may require. These ribs are to be completely fixed in their place, and are to be stayed and supported in the middle, from the heads of two, or more, temporary piles, previously driven into the river to receive them. When both the ribs are thus placed, they will form the main parts for the scaffolding, by which much expence will be saved. B, is one of the circular suspending ribs, composed in this bridge (see B, Fig. 2.) of eight ribs of well-seasoned timber, (but may be of such number, and scantling, as strength and convenience may require,) and two ribs of cast-iron, in long lengths; (one or both of which may be omitted in small bridges;) the whole bound together by strong wrought-iron bolts, large nuts, and heads. The timbers are to be of different lengths, calculated to give strength and unity to the whole, and to break the heading joints, between which may be placed thin plates of copper, or any other metal. The points of the circular ribs are to be bound, and connected to the horizontal ribs, by different
iron

iron straps and bolts, as shewn at C, Fig. 1. These ribs may be erected by beginning at the ends, and uniting them successively and progressively towards the crown, scaffolding and supporting the works from the horizontal ribs. D D, Figs. 1 and 2, shew the suspending bars of wrought-iron, or other metallic substances, with large heads, plates and nuts. Preparation is to be made in the different ribs, to admit these bars to be passed through from the top of the circular ribs, after which the plates and nuts are to be applied, to connect the circular with the lower ribs. E, Fig. 2, is one of the girders or bearers, lying crosswise, about six feet from each other. These girders are to be received in a box-mortise at one end, and a pulley-mortise at the other, so that they may be fixed, or displaced, without affecting the ribs; they are to be secured to the ribs by iron strap-bolts, passing through the sides, and fastened by small screw-bolts to the girders, which will likewise prevent the ribs spreading from each other. F F, Fig. 2, are bearers laid on the girders, longitudinally with the ribs, to be of different lengths, to give strength, and to be secured to the girders by strap-bolts passing through the bearers; to admit the removal of the latter, they are to be stapled to one side only of the girders.—G, Fig. 2, shews the planks lying over the bearers, and secured to them by cross iron plates.

The

The plates to be let into the surface of the planks next the joints, that one half the width of the plate may be on one plank, and the other half on the other, with bolts passing through the same, to secure the planks to the bearers: on these planks, gravel and ballast may or may not be laid. H, Fig. 2, represents one of the cross timbers in the crown of the suspending ribs. These are to be continued down as low as the headway for wag-gons will admit, and are to have cross and diagonal timbers framed in between them, to prevent any lateral pressure from injuring the ribs: they are to be connected to the ribs by proper bearings, bolts, &c. I, Fig. 2, shews a footway, which may or may not be affixed to the bridge at its building, or which may be affixed at any future time. It consists, according to this section, of wrought-iron bottom bars, side bars, and large and small brace-bars: one of each is to be affixed to every suspending bar, by the bottom bar passing on the top of the horizontal rib, and turning up to receive a wrought iron bar, which is to secure it to the suspending bar, as shewn at K.

When a footway is intended to be erected, the cast-iron plate of the horizontal rib should be wider than the timbers, to leave a sufficiency of it for the side and brace-bars to bear thereon; the side bars may be secured to the rib by staples. Four or more timber-bearers are to lie longitudinally

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Fig. 3

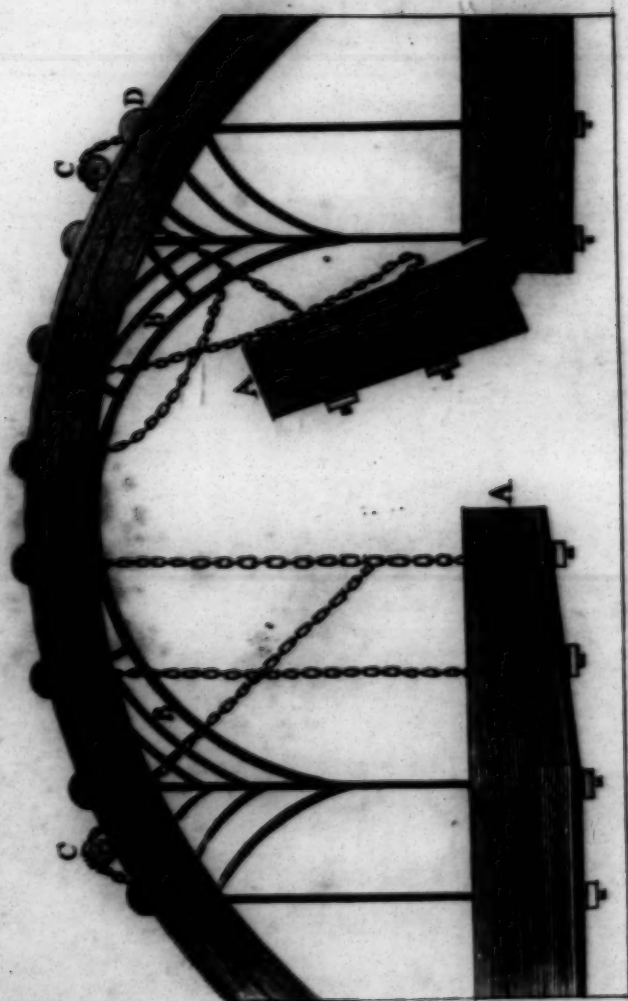


Fig. 4

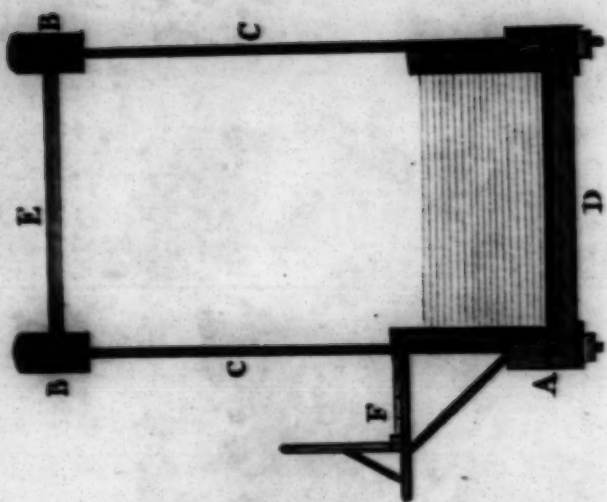
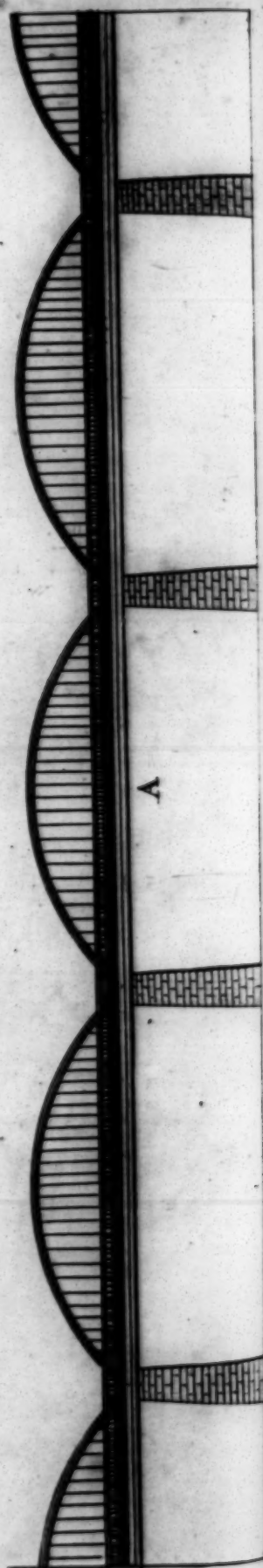


Fig. 5



nally over, and are to be notched on to the bottom bars : on these bearers are to be laid planks, which are to cross the bearers, and to form the floor ; and on or against the front of the outermost bearer, are to be fixed posts, secured by the iron braces, and also at the bottom to the bars : to these posts proper rails, and pannels fitted in, may be affixed. The top of the buttresses may be formed into a double parapet, for a footway between, or the passengers may turn off into the carriage-way. Fig. 3. (Plate XIII.) represents part of a bridge on the before-described construction, in which a draw-bridge is introduced. AA, are the parts of the bridge to be drawn up. BB, is an iron frame, secured to the circular rib, and to two suspending bars, for the purpose of distributing the weight to, and preserving the form of, the arch. The chains here shewn are of the kind generally used, but such as are more proper are on the principle of those for which the Society for the Encouragement of Arts and Manufactures have given a premium, and which act in the same manner as a rope*. CC, are iron rolling-wheels, on which the Chains for raising the bridge are to pass, (other rollers being on the inside,) and are so placed as to cause the bridge, in rising, to clear the suspend-

* The chain here recommended by Mr. Jordan, was described in No. 34 of the Repertory of Arts and Manufactures, page 241.

pending-chains out of the way of the masts. The chains may either be passed through the rib at D, to wind up the bridge by a perpendicular direction, (in which case proper machinery will be affixed on the bridgeway for that purpose,) or the draw-bridge may be taken up by means of weights moving on the surface of the lower parts of the circular rib, and on such parts as may tend rather to benefit than to injure them; and, as the weight of the draw-bridge will be progressively less on the chains, as it rises, the increased velocity and power of the weights may be corrected by the application of springs and inclined planes. Various methods may be adopted for taking up and returning the draw-bridges with ease and facility, and, by a connection of the chains, render the manual force necessary to be employed, not more than that of *one* person. As a counter-balance for the separation of the bridgeway, (if only of one arch,) the ends of it are to go the farther on the buttresses, and are to be fastened to iron bars, brought up a considerable way in the buttresses, and connected with chain-bars laid horizontally in them, for the purpose of forming additional binders to the horizontal ribs of the bridgeway. Where, from the great width of the river, more than one arch may be proper, this precaution will not be necessary, as the horizontal rib will be continued to receive other additional

ditional suspending-ribs, as described hereafter in the construction of continued aqueducts.— Fig. 4. represents the transverse section, and Fig. 5. the elevation, of a continued aqueduct, to which the principles of my invention are applied. A, Figs. 4 and 5, shews the horizontal rib, which is to be put together in a similar manner to that described for the bridge; but, not being liable to so much agitation, nor the support of so great bearings, it may be of smaller scantlings. B B, Fig. 4, are the circular suspending ribs, composed of cast iron, formed in the following manner: each rib-piece is to be cast of a proper length to break the heading-joints, and may appear solid on the face, or may be cast of an open pattern, to give elegance to the appearance of the whole. One rib-piece is to be laid, and secured to the other, so that the rib may be of two, three, or more pieces in width, on one side of the suspending-iron, and of the same number on the other side; and, when combined by bolts and straps, to connect them to each other, and for receiving the hanging-irons, will form a double circular suspending-rib. This mode may be also applied to bridges, and that described for bridges may be applied to aqueducts. C C, Fig. 4, are the suspending-irons, with heads of a size sufficient to cover the rib, and secured at bottom in the same manner as described for the bridgeway, Figs. 1 and

and 2. The heads are to be secured to recesses in the top of the circular ribs, by proper bolts. D, Fig. 4, is one of the girders, which may be put up and united as in the method proposed for the bridgeway, Fig. 2. E, Fig. 4, shews one of the cross-flays, which in this aqueduct, to give it a light appearance, is proposed to be of cast or wrought iron. Cross and diagonal irons are to be added, to answer the purpose mentioned in the description of the crown of the bridgeway, Fig. 2. F, Fig. 4, represents the horse and foot path; but, as the method of constructing this path is nearly the same as that described in the explanation of the footway to the bridge, (see I, Fig. 2,) no more need be observed than that, this being affixed higher, the bottom and brace bars may be connected to the suspending irons by mortises and small bolts, and the floor consist of only one thickness of bearers, laid longitudinally on the iron bottom bar. The bottom and sides of this aqueduct may be of wood, stone, cast or wrought iron, wood lined with sheet-lead, copper, or of other materials, having the upper parts filled in by planks, to give them a bearing against the suspending-irons; by which means, they will be prevented from any accident that a lateral pressure might otherwise occasion. For passing boats and other vessels, an endless rope or chain is to be provided, and vertical and other rollers are to be fixed

clear

clear of the ends of the aqueducts: this rope, or chain, is to lie on the inside and outside of the suspending irons, and round the rollers. When boats, &c. are brought up to the aqueduct, they are to be made fast to that part of the rope or chain next them, and the force employed to draw them being taken to the other end of the path, and fastened to that part of the rope or chain on the outside of the irons, by drawing towards the boats, &c. the first of them will pass the aqueduct (the rest following) in the time the force applied is passing the pathway. This method of passing boats, &c. may be avoided, by erecting the pathway on the inside of the bars, which may be high enough to permit the boats, &c. to pass under it, so that no extra-width in the aqueduct will be necessary on their account. Fig. 5. represents part of an aqueduct, which may, on the same principle, be continued to any extent; the distance of the piers or supports being increased or decreased, regular or irregular, as circumstances and utility may require. Being constructed agreeable to the section, Fig. 4, it needs no explanation, only this may be observed, that as the points of the segments abut on each other, much of the precaution to be observed in the construction of a single arch, to prevent a longitudinal expansion of the rib, will be rendered unnecessary, and the piers or supports will not be liable to

to a lateral, but only to a perpendicular pressure; consequently they may be built much smaller than if liable to a lateral pressure, and may be a framework of iron, or other materials, if thought proper. It will appear, from what has been explained, that bridges and aqueducts may be continued to any length, and extended to any width: they may be continued, by placing such a number of ribs longitudinally as may be necessary; and they may be extended by adding, at such distances as the weight and bearings may require, one, two, or more ranges of ribs between the outer ones. The principles of my invention, as they are to be applied to the covering in of large buildings, may be understood without any drawings to explain them; as similar methods to those proposed for the suspending of bridges and aqueducts may be applied with such variations as the nature of the buildings may require. The ceiling-floor may be suspended by timbers, instead of irons, connected to the tie-beams and suspending-ribs, by iron stirrups and bolts; the ribs may vary somewhat from a curve, and the roof over may be of a common form. The principles of my invention being thus explained and illustrated, by *some* of the modes which may be adopted, I observe that, as the invention itself is not subject to any precise form, size, or scantling, it must always vary according to the nature, extent, and intended

ed service of the works, as well as the kind of materials to be used, which the judicious architect or engineer will accommodate to local and existing circumstances. I have considered it most proper not to perplex the explanation with the dimensions of the various parts, thinking it quite sufficient to describe the nature and utility of my invention, and the manner in which it may be applied. Neither have I explained the good effects and advantages that will arise from it, by speedy erection, by a saving in expence, by durability, by the certain and easy mode of repairing, and various other advantages, because such explanations would not properly form a part of the specification. In witness whereof, &c.

JAMES JORDAN. L. S.

ADVERTISEMENT.

MR. JORDAN, in addition to the explanation of his Invention given in the Specification, respectfully submits to the Public, *some of the peculiar advantages*, that he conceives will attend the adoption of his *Principle* in particular situations:

It effectually does away the principal objections to the erection of *large Arches*, viz.—the want of an *Equal distribution of Weight* and the great *Elevation* of the Bridge;—the weight being *equal everywhere* and the *Elevation* of the Bridge discretionary.

Not being *dependant* on the Tides, they must consequently be *sooner erected*—the *saving* in the *Expende* of *Erection* and *Repairs* be *very great*; their *Durability* prolonged, by the *reduction of Friction* by the Piers being decreased in size and number, (especially on *gravel*, or *sandy bottoms*) and rendered thereby less liable to Accidents, by *Floods*, *Ice*, *Timber*, or *Vessels* striking against them, which on navigable Rivers often, and too often, fatally occur, and which the Drawbridge is intended to assist in the prevention of, as well as *save time* in passing the Bridge, by rendering it *unnecessary to strike the Masts*.

They may combine *Ornament with Utility*, in being thrown over sheets of Water or Canals in Parks, &c. at a small expence, of Timber, Cast-Iron, &c. &c.

Many other advantages a judicious Architect, may adapt to local existing circumstances, which practice only can point out, or discover the Utility of.—It remains only for Mr. JORDAN to state, that he is content that the Invention be adopted and used, under his authority, only as its merits may appear worth the attention of the Public.

•• Applications, addressed to the Patentee, to Mr. JOHN SIMMONS, Surveyor, No. 64, Goswell-Street, London, (where an Elegant MODEL may be seen); or to STEPHEN PRUST, Bristol, will meet respectful attention.

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